Volume 64, Number 6
June 1986

09635 1984301 W 4 1990
SUITE 800 COPY # 1
CONGRESSIONAL INFO SERVIC D
4520 EAST WEST HWY
BETHESDA MD 20814-

Electric Light & Power

THE NEWS MAGAZINE OF ELECTRIC UTILITY MANAGEMENT AND TECHNOLOGY

©TECHNICAL PUBLISHING

Net income, EPS fall for Top 100 electric utilities

Robert A. Lincicome
EL&P Editor-in-Chief

BARRINGTON, IL—Net incomes and earnings for common stock of the Top 100 electric utilities fell in 1985, for the first time in the 21-year history of *Electric Light & Power's* annual report.

The Top 100 utilities suffered massive write-offs of non-reimbursable investment in cancelled nuclear plants that slashed total net income almost 15 percent, to $14.23-billion from $16.71-billion for 1984. Top 100 utilities also were adversely affected by generally higher costs of operations, despite strong cost curtailment efforts and the low inflation rate.

The only good thing about the income decline is that the affected utilities have the write-offs behind them and have already begun rebuilding.

Average earnings per-share fell 30-cents per share, or 9.6 percent, to $2.84 from 3.15 in 1984. However, the write-offs of Public Service of Indiana and Consumers Power were so large in 1985, that if their financial results were removed from the tabulation, per-share earnings would have increased to $3.19

The 21st Annual Top 100 Electric Utilities report begins on page 17

Kilowatthour sales were up slightly for the Top 100 electric utilities, increasing 1.6 percent to 2-trillion kWh. The increase resulted largely from a healthy gain in commercial sales activity and higher sales to other utilities for resale.

Revenues were up to $149.9-billion in 1985, an increase of 3.9 percent. Operating utilities, without holding company affiliations performed better than holding companies.

Informing the public becomes priority for nuclear industry

Don Minner
Associate Editor

BARRINGTON, IL—Nuclear power organizations in America have taken the offensive in recent weeks to inform the public about differences in the U.S. and Russian nuclear power industries.

In the wake of the Chernobyl accident in late April, the top priority for many nuclear organizations and utilities has been to field questions from the media and public, and to stress the unliklihood of a similar accident occurring in the U.S.

Nuclear power advocates are concerned that the Russian incident may hinder the progress of nuclear licensing reform legislation and a bill to extend the Price-Anderson nuclear liability act. In addition, industry officials believe that anti-nuclear groups may be able to use the accident to delay plants waiting to be licensed.

Carl Goldstein, vice president of the U.S. Committee for Energy Awareness, said his organization feels an obligation to ease concerns. The industry-sponsored group re-directed its print advertising campaign and at press time was planning to run a series of explanatory advertisements in major U.S. daily newspapers beginning in May.

Focus of ads

According to Goldstein, the series focuses on the safety of U.S. reactors and directly compares the reactor design differences between the two nations. He said the ads also stress the great amount of independent oversight that the nuclear industry in the U.S. receives from groups like the Nuclear Regulatory Commission, Congress and others.

In addition, he noted that Duke Power Company Chairman and CEO Bill Lee addressed a variety of groups in May on the accident that included, congressmen, New York financial analysts and members of the Washing-

Continued on page 9

Electric capacity added for July Statue of Liberty rededication

Preparations are underway to make sure that electricity will be available to light the Statue of Liberty when President Reagan switches on the power during rededication ceremonies July 3. Crews recently laid a new 4,160-volt cable, wrapped in red, white and blue sheathing, from Liberty State Park in Jersey City that will virtually double the capacity to Liberty Island. The project is a joint effort of Public Service Electric & Gas Company, the Okonite Company, and the Simplex Wire and Cable Company. A new air conditioning system for the Statue, several new elevators and new exterior lighting were installed.

EIA's new outlook predicts electricity growth of 2.7% per year

WASHINGTON, D.C.—Electricity demand in the U.S. will grow at a 2.7 percent a year rate through 1995, according to the Energy Information Administration.

In its *Annual Outlook for U.S. Electric Power 1986*, EIA said electricity demand growth is expected to vary considerably by region, from a low of 2.1 percent a year in the New York/New Jersey region to a high of more than 3.3 percent a year in the North Central, Northwest and Western regions.

"Whereas in the past industrial electricity demand was expected to grow more rapidly than Gross National Product, in this forecast it is projected to grow less rapidly, at an annual average rate of 2.6 percent," stated the report.

EIA attributed the slowdown to expected continued gains in industrial energy conservation and to lower overall growth rates in energy-intensive industries.

The report projects that electricity demand will be slightly lower than economic growth, except under slower economic growth conditions. It covers the period from 1985-1995.

Electricity consumption is expected to grow no faster than GNP, but EIA said it should grow more rapidly between 1985-1995 than nonelectricity energy consumption.

EIA's report shows that more than 85 percent of the increase in total energy use by 1995 is attributable to greater energy use by electric utilities.

The report says, "...electricity as a delivered service is increasingly preferred over other energy sources for its convenience, versatility and price."

Over the period covered in the study, residential electricity consumption should remain at 34 percent, commercial at approximately 29 percent and industrial at about 37 percent.

"Real electricity prices are projected to increase slightly through 1987 and then decline by 1995 to about 8 percent below 1985 levels," predicts EIA, "primarily as a result of declining capital costs per unit of electricity."

Continued on page 8

News Briefs

JILL BUCHHOLZ, Editorial Assistant

GPU Nuclear lawsuit dismissed

● A lawsuit seeking to revoke GPU Nuclear's license to operate the Three Mile Island nuclear plant has been dismissed by the U.S. Third Circuit Court of Appeals. The decision upholds an earlier finding by the U.S. Nuclear Regulatory Commission that GPU Nuclear has the competence and integrity to operate the plant safely. The lawsuit was brought to court by several Pennsylvania legislators and three anti-nuclear groups from New Jersey and Pennsylvania.

HEI acquires two marine transportation subsidiaries

● Hawaiian Electric Industries Inc. (HEI) has acquired two Hawaii-based marine transportation subsidiaries from Dillingham Corp. According to HEI, the two companies, Young Brothers and Dillingham Tug and Barge, had combined revenues totalling approximately $43 million in 1985. Young Brothers moves over 2.5 million revenue tons of cargo per year between six Hawaiian ports and Dillingham Tug and Barge provides contract towing, fuel transportation and ship bunkering, ship assist work and charter barge operations.

Millstone 3 begins commercial operation

● Northeast Utilities (NU) said its Millstone 3 nuclear power plant has begun commercial operation ahead of schedule. The 1,150-MW pressurized water reactor received its full-power license from the Nuclear Regulatory Commission in January and began producing nuclear-generated electricity on February 12. The unit was scheduled to begin commercial operation May 1, but started several days earlier, according to NU.

PSE&G stockholders approve holding company

● The stockholders of Public Service Electric and Gas Co. (PSE&G) have approved the formation of a holding company, Public Service Enterprise Group Inc. (Enterprise). PSE&G Chairman, President and CEO Harold W. Sonn stressed that "PSE&G will continue as a regulated utility—the principal subsidiary of Enterprise—and will have first priority." Enterprise will have two non-regulated subsidiaries as well, Community Energy Alternatives and Public Service Resources Corp., an investment subsidiary.

Chinshan 2 breaks continuous power run record

● Taiwan Power Co. said its Chinshan 2 boiling water reactor nuclear power plant completed a 417-day continuous power run, breaking the second longest run record set by Connecticut Yankee Atomic Power Co.'s Connecticut Yankee plant. The longest run is 439 days by the Oconee 2 unit of Duke Power Co. The 604-MW Chinshan 2 unit, in operation since 1979, is supplied by General Electric Co.'s Nuclear Energy Operations.

NEPOOL reports production cost savings increase

● The New England Power Pool (NEPOOL) said it provided New England electric utilities with energy production cost savings of approximately $37 million in 1985, a 33 percent increase from 1984. The increased savings were due to nuclear generation, coal-fired power and substantial purchases of economy energy from neighboring power pools, according to NEPOOL's 1985 Annual Report. NEPOOL Executive Director Phillip C. Otness said, "Although oil prices started to decline in 1985, much of the credit for lowering the cost of energy should go to NEPOOL member companies for taking actions such as coal and multiple fuel conversions of existing generators to improve the energy mix and increase the economic flexibility of bulk power supplies.

In This Issue

Editorial 4

Calendar 11

21st Annual Top 100 Electric Utilities Report reveals industry growth and recovery slowed in 1985. 17

Optimized distribution secondary design provides savings by adding more smaller transformers and reducing secondary cable use.**T/D** 27

Customer-owned generation can impose dangerous and destructive overvoltages on islanded feeders connecting them to the system.**G** 42

New Products 48

Bulletin Board 52

Readers' Service 53

Regulatory Review 59

Personnel 60

Management Methods 62

EL&P readers whose responsibilities include both Generation and Transmission/Distribution receive both technology sections. Other readers receive the technology section that applies to their respective area of responsibility. The Generation edition is indicated by a single dot (•) in the upper right corner of page 1; the T/D edition carries two dots (••). All readers receive EL&P's industry news section.

EPRI approves revised 1986 budget

● The Electric Power Research Institute (EPRI) has approved a revised 1986 budget, enlarged board membership from 15 to 24 directors and appointed new members to its Advisory Council. The budget, revised due to a three percent decrease from 1985 revenues, totals $311 million. EPRI President Floyd L. Culler said, "The revised budget reflects a temporary decline in membership revenues, the result of several large utilities facing financial problems associated with new nuclear plant construction programs." EPRI said its financial plan assumes member revenues will be generally level through 1988 and has informed its members that there will be no substantive changes in dues levels. Administrative and support expenditures will be reduced through the cancellation of executive salary increases for 1986 and by a reduced general merit increase which will be delayed for one quarter, according to EPRI.

Secretary of Energy releases annual report to Congress

● The Secretary of Energy's seventh Annual Report to Congress is now available. The 200-page report covers energy policy; conservation and energy supply research and technology development; civilian radioactive waste management; energy supporting research and high energy and nuclear physics. It also includes information on environment, safety and health; energy production and marketing; emergency preparedness; international programs; nuclear nonproliferation; the information and regulatory responsibilities of the department; national security and defense programs and departmental management and administration. The report can be obtained for $11.00 from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. The GPO stock number is 061-000-00674-5.

WP&L supports state acid rain control bill

● Wisconsin's new acid rain control bill has the support of Wisconsin Power & Light Company (WP&L). Utility Executive Vice President Bill Keepers said, "We feel that the acid rain control bill signed into law Tuesday, April 22, by Governor Anthony Earl, represents a balanced approach on limiting sulfur dioxide (SO_2) emissions." The bill's timetable calls for a 50 percent reduction in SO_2 emissions by 1993, compared to 1980 levels. Keepers pointed out that utilities have been trying to reduce emissions for years. "Since 1970, while electric generation in Wisconsin has increased by 62 percent, utility SO_2 emissions have declined about 13 percent...." He added that there will be costs associated with further reductions in emissions, which will mean increased electric rates in the 90's for all WP&L customers.

Braidwood 1 successfully supplies power to Edison's grid

● Commonwealth Edison said that its Braidwood 1 generating station is supplying power to the company's northern Illinois electrical grid after successful pre-operational testing. Fuel loading at the station, which is 94 percent complete, is expected to begin this fall and full-scale power production is scheduled for May 1987, according to the company.

Iowa Resources announces two-for-one stock split

● Iowa Resources Inc. said it authorized a two-for-one common stock split and a dividend increase of 40 cents per share after the split. The split goes into effect June 2 and the increased dividend will be payable August 1. According to Iowa Resources, stockholders approved a measure that increased the number of company authorized stock shares from 20 million to 60 million. The company noted that after the split the new annualized rate will be $1.60, up from $1.58 and that nearly 22.3 common shares will be outstanding after the split. Iowa Resources said that in recent weeks the stock's price reached record levels, peaking at $41 per share.

NRC gives Palo Verde 2 license for full power operation

● Unit 2 of Arizona Public Service Company's Palo Verde nuclear generating station has been licensed for full power operation by the Nuclear Regulatory Commission Office of Nuclear Reactor Regulation. The NRC said the unit's output will be about 1270 MW. Other owners of the station are Salt River Project Agricultural Improvement and Power District, Southern California Edison Co., El Paso Electric Co., Public Service Co. of New Mexico, Los Angeles Department of Water and Power and Southern California Public Power Authority.

Three utilities earn EEI Affirmative Action Awards

● The Edison Electric Institute (EEI) has awarded three investor-owned utilities its 1986 Outstanding Achievement in Affirmative Action Award. Receiving the awards were Duke Power Co., for its "Employee Incentive Goal Program: Affirmative Action"; Florida Power Corp., for its "Customer Operations Assistant Program"; and South Carolina Electric & Gas Co., for its "Handicap Employment Program." EEI also presented Certificates for Meritorious Achievement to Detroit Edison Co., for its "Minority and Female Career Pathing for Upper Management" and "Scholarship Program/Special Recruiting Source"; Northeast Utilities, for its "Bilingual Equipment Operator Assistant Training Program"; Public Service Electric & Gas Co., for its "Computer Training Program for the Severely Disabled"; Baltimore Gas & Electric, for its "Minority Scholarship Program"; Public Service Co. of Colorado, for its "Female Training and Placement for Public Assistance Recipients"; Central Illinois Light Co., for its "Career in Utility Management" program; and New York State Electric & Gas Corp., for its "Women's Employment Opportunity Committee" program.

World not prepared for decommissioning plants

WASHINGTON, D.C.—Not one of the 26 countries using nuclear power is prepared for the task of decommissioning the plants, says the author of a new report from the Worldwatch Institute.

Cynthia Pollock points out that although nuclear power supplied 13 percent of the world's electricity in 1984, not one large commerical unit has ever been dismantled. She says that the subject of decommissioning is getting less attention than it deserves.

According to the report entitled *Decommissioning: Nuclear Power's Missing Link*, dozens of small research and military reactors in the U.S. are no longer used and four small retired commercial reactors are awaiting decommissioning. Estimates from the Nuclear Regulatory Commission show that 67 large commercial units will cease operating before 2010.

As for the rest of the world, the report says that more than a dozen reactors are already shut down, 66 will probably be retired by 2000, 162 more will reach their thirtieth year of operation in the next decade. (See table).

"Countries with advanced nuclear programs will soon start to feel the pressure associated with managing the 'back end' of nuclear power production," said Pollock.

NUCLEAR POWER REACTORS IN OPERATION AND UNDER CONSTRUCTION WORLDWIDE, 1956-95, AND YEAR OF EXPECTED RETIREMENT

Entered service	Reactors, number	Capacity, megawatts	Planned retirement after 30 years of operation
1956-60	13	780	1986-1990
1961-65	22	3,920	1991-1995
1966-70	31	10,831	1996-2000
1971-75	84	54,351	2001-2005
1976-80	78	61,476	2006-2010
1981-85	133	117,546	2011-2015
Cumulative in operation	361	248,904	1986-2015
1986-90*	122	114,061	2016-2020
1991-95*	22	18,099	2021-2025
Total	505	381,064	

*Under construction or on order.

Source: "Decommissioning: Nuclear Power's Missing Link," C. Pollock, April 1986.

Another large expense

She believes that utility companies and ratepayers don't want to face another large expense associated with nuclear power. As for politicians, Pollock said they don't want to tackle an issue that won't be addressed until after their political life.

"Developing new technologies and formulating complicated regulatory guidelines for safety handling, transporting, and disposing of radioactive wastes will be difficult to accomplish in such a milieu," Pollock said in the report. "But there can be little argument that public health and safety and the financial solvency of utilities demand accelerated research on and financial planning for decommissioning."

The largest plant ever fully dismantled and decommissioned was the 22 MW Elk River plant. Pollock said DOE completed the three-year project in 1974 at a cost of $6.15 million.

DOE is currently decommissioning the 72 MW Shippingport plant in western Pennsylvania, the nation's first commercial reactor. She criticized DOE for deciding to keep the reactor pressure vessel in one piece instead of chopping it up. The vessel will be buried in an earthen trench at the Hanford nuclear reservation in Washington. By sending the vessel whole, she estimates that DOE will be able to save about $7 million.

Shortsighted action

"This action is shortsighted," stated Pollock. "By employing cost-cutting measures now, DOE is depriving the international nuclear industry—the same one it helped foster—of invaluable lessons. Larger reactors may be too big to ship in one piece, and the most difficult task decommissioning crews of the future will face is dismantling the pressure vessel and its contents."

In Europe, the first decommissioning experience will come from the 100 MW Niederaichbach unit in West Germany, the 33 MW Windscale advanced gas reactor in the United Kingdom, and the 45 MW French G-2 gas reactor at Marcoule.

Reporting on a recent survey of 30 U.S. electric utilities, Pollock said that 22 plan to promptly dismantle and remove their reactors following shutdown. Japanese utilities are told not to wait longer than 10 years after closure to dismantle nuclear units. While in Canada and France, Pollock said utilities plan to mothball the plants for several decades before dismantling them.

Mothballing reactors

Pollock suggests in the report that mothballing reactors may become the only feasible decommissioning strategy, if there is no place to ship the spent fuel.

She explained that almost all of the 12,000 metric tons of spent fuel in the U.S. is currently being stored temporarily in water-filled utility holding ponds. "The volume of waste is expected to quadruple within 15 years," says the report. "Utilities do not have adequate space for storing this spent fuel, nor is there anyplace they can send it."

As for decommissioning costs, Pollock said no one really knows how much money it will take. Estimates range from $50 million to $3 billion per reactor. She noted that most of the reactors will be ready for decommissioning between 2000 and 2020.

It is expected to cost $98 million ($1.36 million per MW) to decommission the Shippingport facility. Pollock said in the report that the figure doesn't include the cost of dismantling non-contaminated buildings.

She believes that utilities should begin setting aside money early in a reactor's life to prepare for its eventual dismantlement.

"If money is not collected from ratepayers during the years the plant produces power," said the author, "the bill will be charged to future customers or taxpayers who did not use the electricity."

Currently, nine states in the U.S. require utilities to make periodic deposits into external accounts for decommissioning purposes. They are California, Colorado, Maine, Massachusetts, Mississippi, New Hampshire, Pennsylvania, Vermont and Wisconsin. Michigan is the only state that doesn't allow recovery of decommissioning costs in current rates.

Consortium should be formed

Pollock suggests that an ad hoc consortium of international nuclear agencies undertake the dismantling of one or several large reactors that become ready for decommissioning in the next three decades to gain firsthand experience on the process.

She said, "The consequences of inadequate planning for decommissioning would be not only costly but dangerous."

Study says renewable energy industry thriving

WASHINGTON, D.C.—Despite falling oil prices, the renewable energy industry is here to stay, claims a new study from the Investor Responsibility Research Center (IRRC).

The report says small-scale power production has experienced a surge that, if sustained, may lead to the alteration of the way electric utilities obtain power for consumers.

According to *Power Plays: Profiles of America's Leading Renewable Electricity Developers*, 104 leading developers of six renewable technologies are currently predicting that they will install almost 14,534 MW of capacity by 1990. The companies reported a total installed renewable generating capacity of 2,236 in 1984.

Company profiles

Profiles of the 104 renewable technology developers are included in the report. The technologies examined are biomass, geothermal, small hydro, photovoltaics, solar thermal and wind.

The IRRC report states that the Public Utility Regulatory Policies Act of 1978 and other government incentives for renewables have worked well.

STATE LEADERS IN THE DEVELOPMENT OF RENEWABLE ENERGY TECHNOLOGIES

Technology	Number of active states	Total MW on-line or with firm plans	Three states leaders in developing technology (with % of total MW)
Waste-to-energy	23	1,664	New York (14.5%), Florida (14.5%), California (12.1%)
Landfill gas	7	44	California (47.5%), Wisconsin (22.7%), New York (20.4%)
Wood	8	771	California (55.9%), Maine (15.8%), Oregon (10.5%)
Geothermal	4	2,404	California (94.9%), Nevada (3.3%), Utah (1.7%)
Wind	7	1,474	California (96.5%), New York (1.2%), Hawaii (1.0%)
Hydro	18	716	Louisiana (26.9%), California (23.7%), New York (17.1%)
Photovoltaics	1	8	California (100%)
Solar thermal	1	211	California (100%)

Source: Investor Responsibility Research Center, Inc.

"Indeed, in some ways," says the study, "these incentives seem to have worked better than the authors of PURPA could have suspected, setting in motion forces that could result in structural changes in the electric utility industry."

Production up since 1980

Excluding small-scale hydropower, the IRRC said recent Department of Energy figures show that electricity production from renewables grew 63.7 percent since 1980. In addition, found the report, renewable generation during the first nine months of 1985 was up 26.7 percent over the same period in 1984.

"IRRC's survey results indicate that this rapid growth can be expected to continue for at least the next several years as larger units come online—especially in the geothermal, hydro and biomass industries—and as wind farm developers continue to increase wind turbine capacity factors," said the report.

Waste-to-energy facilities are expected to be the fastest growing renewable energy source, says the study. Electricity from photovoltaics has the greatest long-run development potential.

"Renewable technologies face tremendous uncertainty in the next few years because of falling oil prices, the apparent loss of government tax credits, and Draconian cutbacks in federal research and development support," says the IRRC report. "A shakeout has already begun among developers of some technologies and will obviously continue."

Some will survive

Developers with capital and superior technology will survive the shakeout and experience a rapidly growing market for their products in the 1990s, says the report.

IRRC said that the disappointments experienced by some of the technologies so far have been more a factor of energy markets not living up to earlier expectations than of failures to meet technological goals.

"In spite of the loss of tax credits and falling fuel prices, the companies involved in renewable energy development do not share the pessimistic outlook for renewable energy that characterizes some utility and government forecasts," says the report.

Even so, the report found that substantial commercial deployment of some technologies especially developing technologies like photovoltaics and solar thermal systems, will be delayed by uncertainties in energy markets and tax policies.

All regions involved

According to the report, all regions in the country are developing at least one of the six technologies examined

Continued on page 6

Editorial

Let's hope for a better 1986

Last year was, for the nation's largest electric utilities, the best of times and the worst of times. It was a year when some utilities were able to strengthen their financial foundations, adding the solidarity of real cash earnings to the paper profits reported over the past few years. But it also was a year when the "have-nots" in the industry, plus a few of the marginal "haves," slipped further into the financial shadows.

As is reported in this year's Top 100 Electric Utilities report (p.17), 1985 was the worst showing by the nation's biggest utility companies since *EL&P* began keeping score 21 years ago, back in 1966. Granted, revenues, which have managed to make solid and consistent gains over the period, did go up again. But the amount of the increase, 3.9 percent, was the lowest yet. And total net income available for common stock and average per-share earnings both fell—by 15 percent and 10 percent, respectively. For both, the net decreases represented firsts in the 21-year history of the report.

The performance of the Top 100 utilities in 1985 serves to further demonstrate the dual nature of the electric power industry...namely that some utilities have and the rest have-not. Those that have largely completed their construction projects, or at least the big vociferous, dollar-gulping nuclear and fossil generation expansion portions of them. They have received rate relief fairly recently and are maintaining a close rein on operating expenses. They are in growth areas or, at the worst, are in areas where load is not contracting.

Conversely, those that suffered the largest declines tend to be those utilities that demonstrate the reverse of those characteristics...namely large continuing generation construction projects (especially nuclear plants), reduced customer and load growth and general economic contractions, and little or no recent rate relief.

And as the old saying goes, "Them that have, get: them that don't, don't."

Although this may always have been true to some degree, the worrisome fact is that the number in the latter catagory has been increasing each of the past three years.

On the positive side, however, many utilities have been able to reduce Allowances for Funds Used During Construction. This means the *quality* of earnings in such utilities are improved, since AFUDC does not generate any cash, but rather is only a paper profit. Also, some utilities without major construction programs have been recognized as "cash cows," utilities in an abnormally high cash-heavy position. But while these factors tend to mitigate against the overall poor showing of the industry, they apply to only a minority of companies. And for every company that has improved its performance, there is more than one that has slid further downhill.

Two conclusions can be drawn from the '85 performances of the Top 100 electric utilities. First, with stock prices generally above book value, most utilities are probably not as favorable an investment as suggested by analysts prior to the release of final 1985 figures, which may come back to haunt the industry in the year ahead. And two, barring a substantial change in conditions—a major surge in industrial activity, rate relief and/or a generally hot summer and cold early winter—the outlook for substantial reversal of the situation does not appear good.

In any case, for most companies on the Top 100 list, it looks like the rest of 1986 will be another time for economic belt-tightening.

Robert A. Lincicome, EL&P Editor-in-Chief

Half of '85 rate increase requests granted

BETHESDA, MD—State public service commissions approved 47 percent of the total amount of revenue increases requested by a representative sampling of utilities in 1985, says Regulatory Information Service.

It said the total amount of approved revenue increases in 1985 for its sampling was $3.5 billion. The total requests amounted to $7.4 billion.

RIS analyzed 112 energy and 55 telecommunications cases in 36 states. It said the information came from public records.

The average overall rate of return requested was 12.29 percent and the average approved was 11.39 percent. For energy cases, averages of 12.49 percent and 11.75 percent were requested and approved.

RIS said return on equity (ROE) was, on average, 16.27 percent requested and 14.72 percent approved. Energy utilities requested an average ROE of 16.27 percent and received an average of 14.91 percent, or 91.6 percent of what was requested.

Entitled *RIS Analysis of Base Rate Cases Decided in 1985*, the 36-page report is available free from Regulatory Information Service, P.O. Box 30056, Bethesda, MD 20814.

KCPL dividend cut; Board announces recovery program

KANSAS CITY, MO—Kansas City Power & Light Company's Board of Directors announced May 6 that it was cutting the company's annual common stock dividend 15.25 percent to $2.00 per share.

Due to a recent Missouri Public Service Commission rate decision, the board said immediate action must be taken to reverse the utility's eroding financial results.

The board stated, "This dividend reduction is part of an overall fiscal recovery program for KCPL, approved by the board and put into effect today."

In April the Missouri commission granted the company a seven year phase-in of $78.2 million, plus carrying costs, for a total of $120.1 million. KCPL had requested $194.7 million on a one-time basis, or a four-year phase-in of $237.6 million.

Included in the rate order was a $126 million rate base disallowance of the utility's 14 percent investment in the Wolf Creek nuclear plant, due to alleged unreasonable cost increases and imprudent management of the project.

In addition, the MPSC determined that 75 percent of the plant represents excess capacity. The commission said the company would be allowed to earn only one-half of the 15 percent equity return on that portion of the plant, while the remaining 25 percent will earn the full return.

KCPL said its fiscal recovery program will include:

* an average 23.5 percent cut in construction budgets through 1988.
* an average annual 7.7 percent cut in its operations and maintenance budgets through 1988.
* a hiring freeze.
* a curtailment of travel.
* a 75 percent reduction in advertising expenses.
* elimination of all charitable contributions from KCPL stockholder funds.
* withdrawal of the company's membership support in numerous civic groups, service clubs, economic development activities and electric in dustry associations.

KCPL's Chairman, President and CEO Arthur J. Doyle said, "Although there can be no assurances, the board believes that, with our fiscal recovery program in place, KCPL will be able to maintain this reduced level of common stock dividends and, hopefully, with our ongoing efforts to secure further additional rate relief, KCPL will be able to start increasing them at an early date."

Moody's Investors Services confirmed its credit ratings on the utility's securities. The company's ratings were placed on special review Dec. 20, 1985.

The agency said it believes that the MPSC rate decision will not allow the company to achieve significant strengthening in its financial position over the next several years.

FASB holds hearing on FAS 71 draft

STAMFORD, CT—More than 70 organizations and individuals will testify at a public hearing here June 4-6 on the Financial Accounting Standards Board proposal (FAS 71) that would require several accounting changes for electric utilities.

The FASB said it is the largest number ever to request time to testify at one of its hearings. Standards issued by the Board are recognized as authoritative by the Securities and Exchange Commission.

The subject of this month's hearing is an exposure draft issued December 1985 that deals with deferred costs under "phase-in" plans for recovery in future years of part of current costs related to new plants. Also, the draft addresses probable future revenue expected to result from the cost of abandoned plants for ratemaking purposes and disallowed costs of new plants.

"The purpose," said FASB Chairman Donald J. Kirk, "is to improve the usefulness and reliability of financial reports for those who base investment credit decisions on them. This is a technical task that cannot be accomplished by popular vote any more than establishing safety standards for nuclear plants can be."

Kirk said the Board is not persuaded "either by rhetoric or by the numbers of people who are for or against a given proposal."

He noted that some utilities have had letter writing campaigns to influence the Board. Kirk said nearly 80 percent of the comments received to date are from letters.

Correction

Georgia Power Company mistakenly listed its 1984 heat rate for the McDonough plant in a form used by the Utility Data Institute for the May 1986 *EL&P* article on the "Top Twenty Heat Rates" on page 19. The plant's heat rate was 9665 Btu/kWhr, dropping it to 30th place. The change means that Pennsylvaia Electric Company's Conemaugh plant (9542 Btu/kWhr) now occupies the 20th place on the list.

Electric Light & Power

EL&P. Staff

Vice President and Group Publisher
Robert J. (Duke) Kiesel

Sales Manager
Arthur L. Rice

Editor-in-Chief
Robert A. Lincicome

Editorial Staff
Donald F. Minner, Jr., Associate Editor
Dianne Wilson, Editorial Assistant
Jill F. Buchholz, Editorial Assistant

John Papamarcos, Consulting Editor
William Kenworthy, Legal/Regulatory Editor
Ted Pollock, Management Editor
Elisa M. Girard, Art Director
Laura Smith, Production Manager

Technical Publishing
a company of The Dun & Bradstreet Corporation
Barrington, IL 60010 • (312) 381-1840

ELECTRIC LIGHT & POWER (USPS 858-860) is published monthly. © copyright 1986, by Technical Publishing a division of Dun-Donnelley Publishing Corporation, a company of the Dun & Bradstreet Corporation—all rights reserved. John K. Abely, President; Robert L. Dickson, Executive Vice President; John R. Emery, Senior Vice President; Robert J. (Duke) Kiesel, Vice President and Group Publisher. Editorial and Executives offices: 1301 S. Grove Ave. P.O. Box 1030, Barrington, IL 60010. Phone (312)381-1840. Distributed to executives and engineers in U.S. electric utilities and consulting engineering firms. Second-class postage paid at Barrington, IL 60010 and at additional mailing office. **Subscriptions:** $38 per year (U.S.) $46 (Canada), and $66 foreign. ($108 foreign air mail). Single copy prices $4.00 + Postage (U.S.) $5.00 + Postage (Canada), and $7 + Postage (Foreign). Copies of back issues are available on microfilm from University Microfilm, 300 N. Zeeb Road, Ann Arbor, MI 48103, and on microfiche from Micro-Photo Div., Bell & Howell, Old Mansfield Rd., Wooster, OH 44691. Postmaster: Send address change to ELECTRIC LIGHT & POWER, P.O. Box 1030, Barrington IL 60010.

Member ABC Audit Bureau of Circulations

ABP

BPA

Advertiser and advertising agency assume liability for all contents (including text representation and illustrations) of advertisements printed, and also assume responsibility for any claims arising therefrom made against the publisher. It is the advertiser's or agency's responsibility to obtain appropriate releases on any items or individuals pictured in the advertisement.

Duquesne Lt. cuts dividend; drops Perry 2 interest

PITTSBURGH—Hard hit by economic problems in its western Pennsylvania service area, Duquesne Light announced in April it was cutting its annual common stock dividend from $2.06 per share to $1.20.

In addition, the utility announced plans to close a generating station and pull out of its commitment to the Perry 2 nuclear unit in Ohio.

Company President Wesley W. von Schack cited unprecedented electric sales losses as the main reason for the actions. "In 1986, we face our lowest projected sales level in 15 years," he said. "In the past five years, industrial sales are down approximately 50 percent and overall sales are down 20 percent."

Duquesne Light had announced in February several cost-cutting measures and plans to reduce utility personnel. The measures included hiring freezes, wage reductions for top management, budget cutbacks and a layoff of 100 employees.

He said the company is reducing its common stock dividend to minimize external financing and forego further dilution of earnings. Duquesne Light also retired $173 million in high yielding debt.

According to von Schack, the utility has the second highest rates in Pennsylvania. He announced rate phase-in plans for the company's interest in the Perry 1 and Beaver Valley 2 nuclear units.

No plans for Perry 2

As for Perry 2, which is jointly owned by members of the CAPCO power pool, von Schack said the company believes that there are no plans to resume construction on the partially completed plant.

"Since we no longer need the capacity of Perry 2," he stated, "we will petition the PUC to recover our $160 million investment over a 10-year period."

The company will file for a "de facto" abandonment of its interest in the unit. Duquesne Light has a 13.74 percent share in the plant.

Also, the utility will close its 325 MW Phillips coal-fired station in late 1986 or early 1987.

Recovery plan announced

Von Schack presented a six-part program called the "Duquesne Plan" that the utility hopes will help in accelerating the economic recovery of the Pittsburgh area.

The six areas of focus are: 1)long-range rate stabilization, 2)marketing and economic development, 3)reshaping the company, 4)improve financial conditions, 5)assistance for financially troubled customers, and 6)stockholder interest.

Duquesne Light will form a new marketing department to help in bringing new jobs to the area. It also plans to offer special economic development incentive rates for new and existing industrial customers.

The company has established several programs to help with assistance for financially troubled customers. Since 1981, Duquesne Light said it has seen a 13 percent increase in the number of delinquent customers and a 45 percent rise in the dollar amount on delinquent accounts.

"Although we are not, and cannot become a social service agency," he stresed, "it is in our own and the community's best interest for us to seek solutions for our own customers genuinely unable to pay for electricity."

In order to search for new investments, the company is studying the possibility of forming a holding company.

Who can help you see streetlighting conversion in a better light?

Utilities have been faced with a big problem in converting mercury or incandescent streetlighting systems to brighter, more energy efficient high pressure sodium (h.p.s.). Until now, the only way to do that has been to replace existing luminaires with new.

Unfortunately, the initial cost for new luminaires and installation labor often extends payback beyond acceptable limits.

Universal's H.P.S. Retrofit Ballast Kit changes that.

Now, instead of replacing the luminaire, you simply replace the old ballast and lamp with our ballast kit and an h.p.s. lamp. It only takes minutes. Your maintenance people can perform the conversion on the pole or in your shop. Because you use your existing luminaires, you gain a substantial immediate savings.

We have conversion kits for cobra head, power door, NEMA head and just about every type of luminaire. If we don't have a kit for yours, we'll design one very quickly. And we back every kit with a full 2-year warranty.

That's why so many utilities have specified Universal's Retrofit Kits when they upgraded their streetlighting.

If you want to see streetlighting conversion in a better light, call (201) 967-7939. Or write Dept. U, Universal Manufacturing Corp., P.O. Box 3028, Paterson, NJ 07509.

UNIVERSAL

Inquire R.S. 1

Research shows hydrogen peroxide a key in acid rain

ARGONNE, IL—Scientists at DOE's Argonne National Laboratory now believe that hydrogen peroxide in the air plays a major role in creating acid rain.

"We have found that 40 percent or more of the sulfate acidity in summer rains in the Northeast comes from reactions of sulfur dioxide with hydrogen peroxide," said Argonne's Ben Holt.

Hydrogen peroxide is naturally present in the air in low concentrations. He said it reacts with sulfur dioxide to form sulfate, a major component of acid rain.

New methods needed

Holt reported that Argonne's work "suggests that controlling hydrogen peroxide could provide an additional way to help control acid rain. Since this is a relatively new idea, methods would have to be devised for detecting and controlling hydrogen peroxide sources."

Argonne's scientists also have developed a way to accurately measure small amounts of hydrogen peroxide in rainwater. According to Holt, the method can also be used to study the role of hydrogen peroxide in making sulfates.

"For example," he said, "we can compare rain upwind and downwind of power plants, urban areas or electrical storms."

After examining summer rain samples collected near Chicago; Dearborn, MI; Whiteface Mountain, NY; and Durham, NC, researchers found that sulfates in rainwater were formed by both hydrogen peroxide and oxidation in the air.

Argonne's research was funded by the U.S. EPA and DOE's Office of Energy Research.

Renewable energy . . from page 3

in the report. Nearly two-thirds of the capacity under development or operating in the U.S. is sited in California (see table).

"Continued growth of non-utility power generation is likely to add to the growing pressure for deregulation of all electric power generation," concludes the report. "Utilities that recognize the changing nature of their business and properly adjust their business strategies to these new conditions will prosper at the expense of their less forward-looking peers."

The IRRC is an independent non-profit research organization. For more information on the report, call the group at (202) 939-6500.

New York City residents pay most for power, says NARUC

WASHINGTON, D.C.—The nationwide average cost of electricity is 8.22 cents per kilowatthour (kWh), according to a survey by the National Association of Regulatory Utility Commissioners.

In its seventh annual summer residential electric bill survey, NARUC said typical residential bills vary by almost 450 percent depending upon the service territory in which the consumer is located.

Customers in Lewiston, ID, the least expensive territory, pay about 3.62 cents per kWh. New York City consumers pay the most for electricity, 15.46 cents per kWh. (See table.)

Report contains comparisons

NARUC's report contains summer 1985 residential electric bill comparisons for the largest service territories of the major investor-owned electric utilities. Residential electric bills for June, July and August of 1985 were reported to the association for three different levels of energy consumption—250-kWh, 500-kWh and 750-kWh.

Other high bills were paid by residents of Kahului, HI (14.12 cents); Long Beach, NY (13.70 cents); and Nantucket, MA (13.64 cents).

NARUC reported low bills in Spokane, WA (3.68 cents); Ontario, OR (3.85 cents); and Yakima, WA (4.00 cents).

Bills increased 2.5 percent

According to the survey, residential electric bills increased approximately 2.5 percent over the previous year's survey. The Consumer Price Index jumped about 3.5 percent during the same period.

The study shows that consumers in 19 service areas pay in excess of 11 cents per-kWh; and customers in 22 territories pay less than 6 cents.

NARUC said a regional analysis of the bills show that rates in the Northeast and Pacific regions were the most expensive, while those of the Northwest and Rocky Mountain regions were least expensive.

A copy of the 218-pp. report may be obtained from NARUC, P.O. Box 684, Washington, D.C. 20044 for $16 per copy. For more information, contact NARUC at (202) 898-2200.

10 MOST EXPENSIVE COMPANIES

Company	City	State	Total bill*	Avg. cost cents/kWh	Rank
1. Consolidated Edison Co. of N.Y.	New York	New York	$231.95	15.46	1
2. Maui Electric Co.	Kahului	Hawaii	$211.78	14.12	2
3. Long Island Lighting Co.	Long Beach	New York	$205.56	13.70	3
4. Nantucket Electric Company	Nantucket	Massachusetts	$204.66	13.64	4
5. Orange & Rockland Utilities, Inc.	Middletown	New York	$202.59	13.51	5
6. Hawaii Electric Light Co.	Hilo	Hawaii	$200.62	13.37	6
7. San Diego Gas & Electric Co.	San Diego	California	$195.00	13.00	7
8. Central Hudson Gas & Elec. Corp.	Poughkeepsie	New York	$184.95	12.33	8
9. Rockland Elec. Co.	Ramsey	New Jersey	$183.15	12.21	9
10. Jersey Central Power & Light Co.	Dover	New Jersey	$179.13	11.94	10

10 LEAST EXPENSIVE COMPANIES

Company	City	State	Total bill*	Avg. cost cents/kWh	Rank
1. Washington Water Power Co.	Lewiston	Idaho	$54.30	3.62	199
2. Washington Water Power Co.	Spokane	Washington	$55.20	3.68	198
3. Idaho Power Co.	Ontario	Oregon	$57.78	3.85	197
4. Pacific Power & Light	Yakima	Washington	$60.04	4.00	196
5. Montana Power Co.	Billings	Montana	$61.40	4.09	195
6. Idaho Power Co.	Boise	Idaho	$62.18	4.15	194
7. CP National Corp.	La Grande	Oregon	$66.19	4.41	193
8. Portland General Elec. Co.	Portland	Oregon	$70.19	4.68	192
9. Puget Sound Power & Light Co.	Bellevue	Washington	$71.40	4.76	191
10. Pacific Power and Light Co.	Kalispell	Montana	$72.02	4.80	190

*Total bill equals total cost of 500 kWh per month for June, July & August.
Source: NARUC's Seventh Summer Residential Electric Bill Survey

PG&E plans large solar project

An artist's conception illustrates the variety of photovoltaic solar systems that Pacific Gas & Electric Company plans to use in an $80 million project designed to develop large-scale applications of the technology.

SAN FRANCISCO—Pacific Gas & Electric Company (PG&E) remains confident that solar power has a bright future.

PG&E Counsel John A. Vance testified before a congressional subcommittee in April in support of a two-phase $80 million project to develop technology for large-scale applications of photovoltaic power.

Congressional approval is required for Department of Energy financial participation in the first phase of the proposed 10-year project. Sites would be located in Davis, CA and San Luis Obispo, CA. PG&E and Bechtel National, Inc. plan to fund the project with DOE. The utility is seeking additional participation from the California Energy Commission, the Electric Power Research Institute and other utilities.

The proposed project would develop 10,000-kW of electricity for the PG&E grid. Construction of the $40 million first phase is expected to be completed by 1989 and will be capable of generating 3,500-kW. Phase two, scheduled for full operation by 1995, will include systems capable of generating 6,500-kW.

Grant Horne, PG&E vice president of corporate communications, said, "Energy planners must look beyond today's realities. The lesson of the 1970s and early 1980s is that oil and natural gas market conditions can change quickly. This project is part of a prudent plan to provide options for energy supply in the future."

Merrick Corp. and Penn Crusher consolidate

BROOMALL, PA—The Merrick Corp., a subsidiary of Penn Virginia Corp., has consolidated with its sister subsidiary Pennsylvania Crusher Corp.

Pennsylvania Crusher Corp. President John D. Whalen believes, "this consolidation will bring together a team of highly respected marketing, technical and managerial talents."

All Merrick departments in New Jersey will be relocated here at the Pennsylvania Crusher facilities.

The Merrick product line will still be marketed under the Merrick name and Merrick customers will continue to be serviced through established channels.

Utility directorship report now available from Stone and Webster

NEW YORK—Utility board members were paid a median annual retainer of $6,000 last year, according to a recent survey from Stone & Webster Management Consultants, Inc.

The report is based on a nationwide survey of 119 utilities providing information on 1,298 board members. Fee schedules for board membership; comprising annual retainers; fees for board meetings and committee meetings; and, total cash compensation are all compared in terms of company size, type and geographic region.

The 119 utilities consisted of 22 holding companies, 38 electric companies, 29 electric & gas companies, 22 gas distribution companies, 2 gas transmission companies and 6 integrated gas companies.

The survey, taken in the fourth quarter of 1985, showed that participants paid board members a median board meeting fee of $500 and a median committee meeting fee of $400. Median annual total cash compensation (retainer plus meeting fees) was reported to be $11,000. It was also found that company size influenced the compensation package provided to outside directors.

According to the report, operating revenues ranged from $17 million to $5 billion, with 26 percent of the participants reporting revenues between $200.1 and $500 million.

Directors' Compensation

Stone & Webster reported that 82 percent of the participants use an annual retainer and meeting fee schedule (board and committee) to compensate their directors. Only six utilities reported that they did not pay on annual retainer, but rely on board and committee fee schedules.

Of the 119 utilities, 77 percent said they do not provide additional compensation to their inside directors for board membership. Of the companies that do provide compensation, the majority utilize the meeting and fee schedule and not an annual retainer, said the report.

The report is available for $495. For more information, contact Victor R. Desposito, Jr. at (212) 290-7057 or Michael Lazorchak at (212) 290-7056.

Lignite-fired plant begins operation

PINEVILLE, LA—Central Louisiana Electric Company's Dolet Hills Unit 1 lignite-fired generating plant began commerical operation in late April.

The 640 MW plant was completed on schedule for $268 million, $6 million under budget. CLECO said the installed cost of the unit was $838 per kilowatt.

Largest construction program

"The commercial operation of Dolet Hills marks the completion of the largest construction program in CLECO's history and represents a milestone in our fuel diversification program," said CLECO President and CEO William F. Terbot. "This program is designed to reduce the company's dependence on higher, less-stable priced natural gas, while also avoiding the high cost of nuclear generation."

With the new plant, the utility noted that it will be meeting about 50 percent of its fuel needs with coal and lignite. Before 1982, the company used only natural gas and oil.

Fuel costs less

"Fuel cost for lignite-fired Dolet Hills is about $1.20 per MMBTU, which is substantially less than our current cost of gas generation," explained Terbot. "We estimate Dolet Hill's first year of operation will result in approximately $34 million in fuel cost savings to the company's customers by allowing us to displace gas-fired generation."

Ample reserves

CLECO will operate the plant, which is a mine-mouth operation. Along with a neighboring utility, CLECO holds the rights to an estimated 150 million tons of lignite reserves. According to the utility, the reserves are enough to support two of the 640 MW units for 30 years.

Terbot said that approximately 300 new jobs would be created by the plant's operation.

21st Annual Top 100 Electric Utilities Report

1985 financial performance was worst since EL&P started Top 100 record-keeping in 1966

Robert A. Lincicome
EL&P Editor-in-Chief

The five year financial recovery of the nation's largest investor-owned electric utility companies skidded to a virtual halt in 1985. While the Top 100 electric utilities collectively eeked out a small gain in total revenues, net income and average earnings per share fell.

It was the most dismal year for the Top 100 electric utilities, collectively, since *EL&P* launched the annual Top 100 series 21 years ago.

Although total corporate revenues climbed to $149.8-billion, an increase of 3.9 percent, after-tax income declined almost 15 percent, or $2.5-billion, and average per-share earnings for the 99 reporting companies dropped 30-cents per share, or nearly 10 percent from a year ago.

Three causes

Three factors were responsible for the disappointing performance.

First, utilities burdened with cancelled nuclear facilities took huge write-offs following adverse regulatory decisions absolving their customers of responsibility for payment of costs of the abandoned facilites.

Second, kilowatthour sales for many companies were disappointing as milder-than-normal weather prevailed for most of the year and the healthy economic recovery everyone expected never really got up to speed. This was especially true for utilities with normally large heavy-industry load.

Third, the effect of rate relief was generally less in 1985 than in the previous few years as reduced inflationary pressures and increased revenues generally decreased both the number of rate relief requests and the amounts granted by regulatory commissions.

Performance summary

During 1985, total revenues of the nation's Top 100 electric utilities increased 3.9 percent, one of the smallest revenue increases in more than a decade. Revenues climbed to $149.8-billion, compared with revenues of $144.3-billion in 1984.

The revenue increase came on an increase in kilowatthour sales of 1.6 percent, to 2.0 trillion kWh. The primary cause of this increase was a 6-percent gain in commercial sales.

But net income available for shareholders fell almost 15 percent, to $14.2-billion from $16.7-billion in 1984. Although most income performances generally were off during 1985, the sharp decline in total income available for common stock, the first in the 21-year history of the Top 100 series of reports, came as a result of massive write-offs taken by utilities that had cancelled nuclear programs.

Earnings per average common share, similarly, suffered from the nuclear plant write-offs, decreasing 30 cents per share, or 9.6 percent, to $2.84 per share. However, removal of just the two major earnings losers (Public Service of Indiana and Consumers Power) from the earnings of the 99 reporting companies allowed average earnings to eek out a tiny gain. For the 97 remaining companies, average earnings climbed to $3.19 in 1985, compared with $3.18 a year earlier.

Long-term debt increased in 1985 to $150-billion, up 7.3 percent from 1984. Eighty companies increased their total long-term debt, while 29 reduced debt. The portion of net plant covered by debt remained almost the same as in 1984, at 46.6 percent. Forty-two companies increased the percentage of net plant covered by long-term debt during 1985.

Electric customer growth by the Top 100 electric utilities was 2.6 percent in 1985, to 76.2 million, from 74.7 million in 1984. Gas customers of combination companies grew at a faster rate, 5.3 percent, to 17.3 million.

Despite the 2.6 percent growth in electric customers, kilowatthour sales by the Top 100 electric utilities increased only slightly, climbing to 1.99-trillion kWh, a gain of just 1.6 percent, from the 1984 total of 1.96-trillion.

Although 69 companies increased kWh sales in 1985, the gains generally were small. Only 14 companies posted sales gains greater than the historic 7-percent average rate enjoyed by the entire industry prior to the Arab Oil Embargo. While the largest of these was a healthy 36.3 percent (Tucson Electric Power), the median growth was just 2.1 percent, down more than 34 percent from 1984.

There were only small changes among the rankings of the largest sellers of electricity (see Table 1). Southern California Edison, 5th in

EARNINGS GROWTH STATISTICS

Company	Rank	% Change From 1984	1985 Earnings Per Share, $	1984 Earnings Per Share, $
Long Island Lighting	6	28.48	3.97	3.09
Washington Water Power	7	23.17	3.03	2.46
FPL Group (FP&L)	8	18.70	3.11	2.62
Minnesota Power	9	15.02	4.67	4.06
Houston Industries	10	14.81	4.42	3.85
San Diego Gas & Electric	16	7.97	3.25	3.01
United Illuminating	17	7.78	5.82	5.40
Southern Company	18	6.67	3.20	3.00
Hawaiian Electric	19	6.67	2.40	2.25
Midwest Energy	20	6.34	2.85	2.68
Detroit Edison	26	5.91	2.33	2.20
Central & South West	27	5.87	3.61	3.41
Southwestern Public Service	28	5.84	2.72	2.57
Central Hudson Gas & Electric	29	5.42	4.67	4.43
Delmarva Power & Light	30	4.94	2.76	2.63
Utilicorp United	36	3.68	3.10	2.99
Wisconsin Power & Light	37	3.40	4.26	4.12
Southern California Edison	38	2.52	3.26	3.18
Duquesne Light	39	2.26	2.26	2.21
Northern States Power	40	2.24	5.93	5.80
Central Louisiana Electric	46	0.83	3.65	3.62
Union Electric	47	0.70	2.86	2.84
Savannah Electric & Power	48	0.69	2.90	2.88
Pacificorp	49	0.58	3.44	3.42
Commonwealth Edison	50	0.45	4.45	4.43
Central Illinois Light	56	–1.06	2.79	2.82
Iowa-Illinois Gas & Electric	57	–1.45	4.07	4.13
Kansas City Power & Light	58	–1.56	4.41	4.48
Rochester Gas & Electric	59	–1.65	3.58	3.64
Ohio Edison	60	–2.00	2.45	2.50
Toledo Edison	66	–4.32	3.54	3.70
Northeast Utilities	67	–4.56	2.72	2.85
Consolidated Edison	68	–4.91	4.26	4.48
Philadelphia Electric	69	–5.19	2.56	2.70
Commonwealth Energy	70	–5.26	4.50	4.75
Oklahoma Gas & Electric	76	–6.88	2.30	2.47
Empire District Electric	77	–7.09	2.75	2.96
Scana Corp.	78	–7.54	2.82	3.05
Sierra Pacific Resources	79	–7.58	1.95	2.11
Gulf States Utilities	80	–8.70	2.10	2.30
Louisville Gas & Electric	86	–16.89	3.15	3.79
American Electric Power	87	–17.36	2.19	2.65
Idaho Power	88	–17.87	2.16	2.63
Public Service of New Hampshire	89	–18.57	2.50	3.07
Public Service of Colorado	90	–29.02	1.81	2.55
Central Maine Power	96	–95.98	0.08	1.99
Northern Indiana Public Service	97	–114.20	–0.23	1.62
Consumers Power	98	–487.72	–4.42	1.14
Public Service of Indiana	99	–2285.85	–23.17	1.06
Centel	100	NA	NA	NA

SALES DATA

Company	1985 Total Sales (KWH) Rank	% Increase	Average Annual Growth 1980 – 1985	1985 Sales (KWH) By Type of Customer (% of Sales) Resid.	Comm.	Indus.	Other	Average Annual Residential Use 1985	1984	Ratio of Long-Term Debt to Net Plant 1985	1984
New York State Electric & Gas	6	13.7	2.77	28.1	16.3	17.1	38.5	7,387	7,426	51.9	50.4
Southwestern Public Service	7	12.3	4.23	13.0	14.2	37.2	35.5	7,574	7,830	39.5	41.0
Boston Edison	8	12.2	–0.22	22.0	45.5	13.8	18.7	5,512	5,551	41.4	40.1
Pacificorp	9	11.0	1.24	25.6	19.9	28.1	26.4	12,287	12,289	51.4	52.2
Kentucky Utilities	10	10.5	–1.65	31.2	21.0	19.1	28.7	10,591	10,873	34.5	37.8
Dominion Resources	16	6.2	–0.04	34.9	26.7	17.0	21.3	11,376	11,181	49.7	50.1
Middle South Utilities	17	6.2	–0.78	29.8	20.0	37.7	12.6	11,628	11,307	47.1	51.3
Texas Utilities	18	6.1	3.63	33.1	27.7	28.5	10.6	13,062	12,887	36.8	37.4
El Paso Electric	19	6.0	1.65	25.2	28.1	16.3	30.4	5,735	5,755	49.6	48.9
Nevada Power	20	5.4	3.42	42.9	2.8	47.5	6.7	13,805	13,812	32.6	44.3
Scana Corp.	26	3.6	1.32	30.9	25.7	33.6	9.7	11,992	12,061	35.5	40.7
Utah Power & Light	27	3.6	4.09	18.9	15.8	37.4	27.9	8,206	8,268	40.8	42.9
Public Service of New Hampshire	28	3.4	1.96	28.0	12.2	28.9	30.8	6,989	7,067	45.6	47.3
Florida Progress (FPC)	29	3.3	1.25	43.1	24.0	14.9	18.0	10,940	10,638	37.6	43.0
Public Service of New Mexico	30	3.3	6.67	17.7	23.7	10.6	47.9	5,925	6,022	49.7	46.9
Delmarva Power & Light	36	2.7	2.27	26.5	25.4	30.6	17.6	8,059	8,283	47.1	42.2
Dayton Power & Light	37	2.6	1.05	35.1	22.0	32.3	10.5	9,599	9,786	104.3	49.5
Southern California Edison	38	2.6	1.13	28.6	39.9	22.1	9.4	6,099	6,147	46.2	44.9
Washington Water Power	39	2.6	0.65	34.2	20.3	13.4	32.1	14,997	14,854	45.5	49.8
Iowa Resources	40	2.6	0.75	36.7	24.9	32.8	5.6	8,295	8,515	45.9	46.2
Detroit Edison	46	2.3	0.97	27.5	19.4	45.3	7.8	6,165	6,253	43.8	47.6
Pacific Gas & Electric	47	2.2	1.73	32.5	33.1	26.3	8.0	6,533	6,557	60.3	78.0
Iowa Electric Light & Power	48	2.2	0.58	33.0	25.6	33.2	8.3	7,891	8,116	38.0	33.6
Utilicorp United	49	2.2	1.25	38.6	25.9	20.3	15.3	8,369	8,550	42.2	35.7
Carolina Power & Light	50	2.1	1.18	25.2	18.2	32.7	23.9	11,522	11,891	41.8	40.6
Montana Power	56	1.0	–0.43	24.7	33.4	17.7	24.2	9,267	9,053	48.0	48.7
Kansas City Power & Light	57	1.0	0.50	29.9	42.2	25.3	2.6	8,197	8,327	46.7	46.4
Northeast Utilities	58	0.9	0.83	36.3	33.2	24.5	6.1	7,492	7,596	45.2	45.9
Commonwealth Edison	59	0.8	0.35	28.0	32.8	27.8	11.5	6,458	6,583	37.1	40.5
Wisconsin Electric Power	60	0.7	1.00	29.7	26.1	33.6	10.6	7,367	7,331	42.1	38.2
MDU Resources Group	66	0.3	3.85	40.4	24.8	31.1	3.7	7,788	7,866	38.7	41.9
Cleveland Electric Illuminating	67	0.3	–0.98	25.5	26.1	46.1	2.4	6,567	6,646	44.1	44.6
Long Island Lighting	68	0.1	0.63	42.6	52.6	0.0	4.8	7,018	7,136	37.2	35.7
Toledo Edison	69	0.0	1.16	25.2	19.0	45.4	10.3	7,770	8,045	130.3	108.2
Midwest Energy	70	–0.1	–0.66	31.3	27.0	24.3	17.5	7,267	7,166	47.3	47.6
Central & South West	76	–0.8	0.64	28.0	23.1	32.7	16.2	10,208	9,902	45.8	37.4
Central Maine Power	77	–0.9	6.20	33.9	22.0	42.0	2.2	7,013	7,109	52.3	54.4
Iowa-Illinois Gas & Electric	78	–1.3	0.45	23.4	26.7	43.0	6.9	6,040	6,166	36.0	35.2
Interstate Power	79	–1.8	0.87	23.3	18.7	51.7	6.2	7,127	7,132	48.7	47.4
Public Service of Indiana	80	–1.9	–0.36	27.5	21.9	35.7	14.9	10,347	10,843	76.3	74.3
Central	86	–3.9	–1.25	28.0	28.7	21.8	21.6	6,686	6,794	0.0	0.0
Central Illinois Public Service	87	–4.1	–0.29	26.9	11.6	40.5	21.0	8,351	8,593	39.7	39.8
Northern Indiana Public Service	88	–4.2	–0.64	17.6	3.9	75.3	3.2	6,531	6,670	48.4	44.4
New England Electric	89	–4.3	2.98	35.1	31.7	25.1	8.0	6,302	6,323	53.7	56.3
Philadelphia Electric	90	–4.3	1.28	30.0	13.3	53.0	3.7	6,820	6,960	47.4	44.7
Central Hudson Gas & Electric	96	–8.4	2.99	24.7	23.7	28.9	22.7	6,254	6,389	119.8	97.8
Southern Indiana Gas & Electric	97	–10.3	1.03	24.4	19.4	38.1	18.0	10,696	10,704	37.2	45.2
American Electric Power	98	–10.5	0.15	22.7	15.5	35.6	26.2	10,014	10,023	53.9	52.9
Minnesota Power	99	–11.2	0.90	10.0	8.8	66.0	15.1	8,123	8,014	51.8	51.4
Kansas Power & Light	100	–63.5	35.15	21.7	26.2	20.2	31.9	7,864	7,971	33.9	35.9

1984, replaced neighboring Pacific Gas & Electric in fourth place, and Middle South Utilities moved from ninth to seventh.

Commercial (and small power) sales gained the most during the year, climbing 6.0 percent to 498.9 billion in 1985, compared with 470.7-billion a year earlier. "Other" sales, including sales for resale, also increased healthily, from 298.3 billion to 313.6 billion, a gain of 5.1 percent.

Industrial (and large power) sales meandered along all year, but the expected increase from the continuing recovery of the economy in general never got off the ground. Companies in what has become known as the Rust Belt, such as Duquesne Light and American Electric Power, were especially hard hit. But most other utilities also suffered reductions in industrial and large power sales. Overall, industrial sales declined 3.5 percent, from 632.2 billion in 1984 to 610.0 billion last year.

TABLE I
THE TOP 10 IN KWH SALES

1	1	Southern Company	126,057	10.1
3	3	Texas Utilities	73,370	6.1
5	4	Pacific Gas & Electric	64,728	2.2
7	9	Middle South Utilities	56,263	6.2
9	7	Houston Industries	55,969	(6.3)

Residential usage inched up 1.8 percent, fractionally lower than the growth in number of customers, and well below the gain registered in 1984. Average residential use of electricity decreased from a record 8688 kWh in 1984 to 8651 kWh in 1985. As in the past, the companies recording the highest residential usages were located in the Pacific Northwest, where power rates are relatively low, and in the areas where summer temperatures and humidities make air conditioning essential to comfort.

Leaders were 1. Idaho Power, 15,432 kWh; 2. Washington Water Power, 14,997 kWh; 3. Puget Sound Power & Light, 14,252 kWh; 4. Nevada Power, 13,805 kWh and 5. Texas Utilities, 13,062 kWh.

Conversely, utilities at the other end of the residential-usage scale, those posting the smallest use by their customers, tended to be in high-cost areas. Companies posting the lowest residential useages in 1985 were: 96. Eastern Utilities Associates, 5582 kWh; 97. Boston Edison, 5512 kWh; 98. Public Service Electric & Gas, 5494 kWh; 99. San Diego Gas & Electric, 5413 kWh and 100. Consolidated Edison, 3386 kWh.

Revenue gains

Total revenues of the Top 100 investor-owned electric utilities increased just 3.9 percent in 1985, a substantial drop from a year ago when gains of 15.7 were posted. As mentioned above, the reduced growth rate reflects both the slower growth in kWh sales and reduced rate relief by regulatory agencies.

The total posted by the Top 100 includes revenues from all sources, including those of non-regulated sub-

sidiaries of holding companies and totalled $149.9-billion, compared with $144.3-billion in 1984.

Revenues from electric operations increased 4.6 percent, to $128.8-billion from $123.2-billion a year earlier. At the same time, combination companies posted gas revenues of $17.9-billion, down 2.8 percent from 1984, when they registered gas revenues of $18.4-billion.

Gains in "Other" revenues were the highest, at 15.4 percent, reflecting increased efforts by utilities to diversify. Other revenues totalled $3.1-billin in 1985, compared with $22.7-billion in 1984.

Interestingly, total revenues of holding companies held almost constant in 1985 with those for 1984, increasing just 0.6 percent to $46.7-billion from $46.4-billion in 1984.

TABLE II
THE TOP 10
TOTAL REVENUES

1	1	Pacific Gas & Electric	$8,431	7.7
3	3	Consolidated Edison	5,498	(4.0)
5	5	Commonwealth Edison	4,964	0.7
7	7	Public Service Electric & Gas	4,409	5.1
9	9	Texas Utilities	4,170	6.1

Operating electric and combination companies without holding company relationships performed better than holding companies. Revenue gains for those companies without holding company relationships were 5.3 percent, to $103.1-billion from $97.9-billion in 1984.

Twenty-six companies on the 1985 Top 100 list are holding companies, the same as a year ago.

Thirty-five companies reported declines in revenues in 1985, including 19 that encountered kWh sales decreases.

The largest revenue gains were posted by Public Service of New Mexico (+68.2 percent) on the strength of higher rates and a small increase in kWh sales, Tucson Electric Power (+27 percent) as a result of a healthy 36.3 percent sales gain, the highest among the Top 100 electric utilities; and Pennsylvania Power & Light, (+26.5 percent), on the basis of increased kWh sales, largely to other utilities.

Companies at the opposite end of the scale were: 98. Boston Edison (-8.6 percent), despite a relatively strong sales showing that ranked it seventh among the Top 100; 99. Illinois Power (-8.8 percent), after a 6.7 percent decline in kWh sales and 100. Central Illinois Light (-9.5 percent), on reduced kWh sales.

A total of 47 utilities enjoyed revenues in excess of $1-billion, one less than in 1984. The ten largest revenue producers are shown in Table II, which reflects only a switch in the rankings of two companies.

Net incomes down

For the first time in the 21 year history of the Top 100 report, net income available for common stock declined, falling 14.8 percent to $14.23-billion from $16.71-billion in 1984. The decline was primarily due to the large

FINANCIAL STATISTICS

Company	Net Income Rank	Net Income % Gain	Revenue Rank	Revenue % Gain	Sales (KWH) Rank	Sales (KWH) % Gain	Int. Cov. Ratio 1985	Int. Cov. Ratio 1984	Earnings Per Share $ 1985	Price/Share 1985 (Dollars) High	Price/Share 1985 (Dollars) Low	% Change Long-Term Debt '84-'85
Public Service of New Mexico	6	33.1	1	68.2	30	3.3	1.01	0.87	3.30	30.750	23.875	9.33
Long Island Lighting	7	29.5	47	3.0	68	0.1	1.35	1.23	3.97	9.375	5.750	17.36
Washington Water Power	8	28.2	14	11.2	39	2.6	1.51	1.16	3.03	25.125	18.500	-2.44
Houston Industries	9	26.0	80	-2.9	92	-6.3	2.03	1.50	4.42	29.500	21.750	11.68
FPL Group (FP&L)	10	23.0	16	10.4	24	4.2	1.19	0.97	3.11	29.000	20.500	-2.36
Duquesne Light	16	14.7	51	2.4	31	3.2	1.01	0.98	2.26	17.500	14.125	9.45
Carolina Power & Light	17	14.3	41	4.3	50	2.1	1.42	1.36	3.86	30.875	24.125	16.59
Niagara Mohawk Power	18	14.1	85	-3.3	3	15.5	1.32	1.30	2.88	21.875	16.375	10.14
Toledo Edison	19	13.0	21	8.0	69	0.0	1.12	1.19	3.54	22.125	16.500	20.64
Public Service Electric & Gas	20	12.7	36	5.1	45	2.3	1.67	1.54	3.96	33.125	25.375	1.98
United Illuminating	26	11.0	61	1.1	55	1.3	0.91	1.36	5.82	27.125	13.750	16.96
Hawaiian Electric	27	10.5	88	-3.7	64	0.4	1.39	1.32	2.40	25.375	19.625	2.14
Commonwealth Edison	28	10.3	63	0.7	59	0.8	1.28	1.18	4.45	32.875	27.000	0.30
Tucson Electric Power	29	10.3	2	27.0	1	36.3	5.19	8.30	4.35	45.500	32.375	16.93
Central Vermont Public Service	30	9.7	19	9.6	93	-6.4	2.34	2.61	3.39	22.125	16.500	15.38
Portland General Electric	36	8.9	8	14.5	5	14.7	1.27	1.12	2.97	23.250	16.125	-8.17
Midwest Energy	37	8.6	72	-1.4	70	-0.1	1.05	0.92	2.85	33.125	26.250	-1.56
Cleveland Electric Illuminating	38	8.4	45	3.2	67	0.3	1.27	1.37	3.53	25.625	18.250	10.75
New England Electric	39	8.2	79	-2.8	89	-4.3	1.96	1.58	3.15	25.750	18.125	-1.36
Central & South West	40	7.1	75	-2.0	76	-0.8	1.28	1.40	3.61	28.125	21.625	30.78
Wisconsin Electric Power	46	5.8	67	-0.4	60	0.7	2.80	2.68	4.75	40.500	30.750	9.72
Delmarva Power & Light	47	5.8	49	2.9	36	2.7	1.74	1.66	2.76	28.250	21.000	14.40
Wisconsin Power & Light	48	5.3	52	2.3	44	2.4	2.71	2.28	4.26	40.500	29.125	11.16
Utilicorp United	49	4.9	43	3.8	49	2.2	1.67	1.49	3.10	26.500	18.875	76.25
Union Electric	50	4.9	11	12.7	52	1.8	1.13	1.11	2.86	21.875	15.375	-0.11
Northern States Power	56	3.3	62	0.7	32	3.1	2.10	2.23	5.93	54.750	41.125	9.63
Kansas City Power & Light	57	2.9	53	2.3	57	1.0	1.31	1.42	4.41	24.500	18.000	9.36
Iowa Resources	58	2.9	38	4.7	40	2.6	1.31	1.31	4.11	37.875	28.875	-2.33
Gulf States Utilities	59	2.8	6	20.1	95	-8.2	1.29	1.35	2.10	16.500	11.625	18.24
Wisconsin Public Service	60	2.8	69	-0.9	72	-0.3	2.68	2.48	4.45	40.750	29.750	16.10
Northeast Utilities	66	-0.1	68	-0.7	58	0.9	1.67	1.66	2.72	18.750	13.750	9.95
New York State Electric & Gas	67	-0.4	17	10.0	6	13.7	1.11	1.23	3.46	29.250	21.250	11.26
Eastern Utilities Associates	68	-0.9	96	-7.7	61	0.7	0.78	0.84	2.67	26.875	16.375	-1.17
Central Illinois Light	69	-0.9	99	-9.5	84	-3.2	1.59	1.65	2.79	27.250	21.750	-0.02
Kansas Power & Light	70	-1.4	97	-8.5	100	-63.5	1.50	1.42	4.61	41.375	32.375	-3.74
Empire District Electric	76	-3.5	54	2.1	22	4.4	1.83	1.92	2.75	24.375	18.625	0.00
Ipalco	77	-3.6	50	2.6	54	1.4	1.29	1.66	3.81	40.000	31.375	5.79
Atlantic Electric	78	-3.8	33	5.5	43	2.4	1.30	1.40	3.00	29.750	23.750	14.20
Kentucky Utilities	79	-4.6	58	1.3	10	10.5	1.40	1.24	2.84	31.250	26.125	-9.97
Oklahoma Gas & Electric	80	-4.7	34	5.5	91	-5.0	1.64	1.78	2.30	27.625	21.500	0.00
Consolidated Edison	86	-9.6	90	-4.0	63	0.6	2.82	3.24	4.26	29.375	20.125	7.50
Pennsylvania Power & Light	87	-12.1	3	26.5	4	14.8	0.65	1.01	2.68	29.000	23.500	0.02
American Electric Power	88	-14.1	76	-2.1	98	-10.5	0.75	0.97	2.19	24.875	19.875	1.24
Idaho Power	89	-16.2	35	5.5	85	-3.4	1.34	1.61	2.16	24.500	18.750	1.75
Middle South Utilities	90	-21.1	48	2.9	17	6.2	0.66	1.11	2.01	10.875	9.375	-3.15
Northern Indiana Public Service	96	-91.2	91	-4.6	88	-4.2	0.09	1.02	-0.23	12.875	8.375	14.66
Central Maine Power	97	-95.9	40	4.4	77	-0.9	0.03	1.04	0.08	14.375	9.250	-3.10
Consumers Power	98	-490.3	55	1.9	51	2.1	-0.85	0.28	-4.42	8.875	4.375	5.45
Public Service of Indiana	99	-2289.7	27	7.1	80	-1.9	-7.28	0.31	-23.17	10.125	6.875	-1.73
Centel	100	NA	59	1.3	86	-3.9	NA	NA	NA	NA	NA	NA

ALPHABETICAL LISTING OF COMPANY PERFORMANCES

Company	Electric Sales Rank	Electric Sales KWH Sales (millions)	Customers Served Electric Total (1000's)	Customers Served Electric % Gain	Customers Served Gas Total (1000's)	Customers Served Gas % Gain	Revenues Total $ (1000's)	Revenues % Electric	Revenues % Gas	Net Income After Tax $ (1000's)
Boston Edison	48	13,174	600,763	1.1	0	NA	1,203,972	94.9	0.0	94,232
Carolina Power & Light	18	32,752	852,919	3.8	0	NA	1,934,715	100.0	0.0	281,483
Centel	95	2,720	135,332	0.7	0	NA	182,417	99.3	0.0	NA
Central & South West	11	47,640	1,515,100	1.4	0	NA	2,710,751	97.9	2.1	339,760
Central Hudson Gas & Electric	79	5,001	230,567	2.3	50,698	4.3	504,802	86.5	13.5	53,488
Cincinnati Gas & Electric	43	15,785	622,532	1.3	369,460	0.5	1,396,549	67.9	32.1	143,889
Cleveland Electric Illuminating	39	17,319	718,504	0.5	0	NA	1,253,990	99.0	0.0	269,236
Commonwealth Edison	6	63,831	3,027,872	0.6	0	NA	4,964,151	100.0	0.0	839,625
Commonwealth Energy	78	5,925	314,000	6.1	208,000	1.5	678,077	61.3	38.7	40,698
Consolidated Edison	14	39,399	2,806,330	0.8	1,020,274	0.2	5,497,920	80.2	14.0	525,354
Duke Power	8	56,058	1,439,457	3.1	0	NA	2,898,911	98.6	0.0	376,681
Duquesne Light	50	12,989	561,549	0.2	0	NA	914,864	100.0	0.0	154,707
Eastern Utilities Associates	91	3,625	239,000	1.7	0	NA	333,510	100.0	0.0	29,770
El Paso Electric	84	4,278	212,901	3.4	0	NA	339,591	99.3	0.0	113,071
Empire District Electric	93	3,041	107,271	2.1	0	NA	126,986	99.6	0.0	14,191
Houston Industries	9	55,969	1,316,316	0.3	0	NA	4,061,812	87.0	0.0	464,394
Idaho Power	44	14,915	272,169	1.2	0	NA	451,180	100.0	0.0	72,376
Illinois Power	45	14,427	537,047	0.7	382,442	0.2	1,167,364	65.7	34.3	207,240
Interstate Power	90	3,782	123,950	0.0	40,494	0.4	300,612	68.2	31.8	19,289
Iowa Electric Light & Power	85	4,195	205,959	0.6	132,986	-0.1	453,262	64.3	34.2	19,056
Kansas Power & Light	58	9,176	291,317	1.5	1,146,636	4.2	1,354,128	35.5	64.5	79,002
Kentucky Utilities	54	10,918	384,600	1.7	0	NA	538,039	100.0	0.0	53,690
Long Island Lighting	46	14,016	948,797	1.4	405,330	0.7	2,033,737	82.6	17.4	440,563
Louisville Gas & Electric	63	8,033	305,979	1.3	234,752	0.4	679,508	66.6	32.8	60,001
Madison Gas & Electric	99	1,993	104,445	1.4	73,725	2.6	223,864	55.1	44.6	19,515
Nevada Power	75	6,520	235,197	4.7	0	NA	360,632	100.0	0.0	39,905
New England Electric	35	18,338	1,147,399	2.2	0	NA	1,444,279	94.9	3.4	164,078
New York State Electric & Gas	41	16,426	703,966	1.6	131,822	0.7	1,241,780	84.7	15.3	183,207
Niagara Mohawk Power	16	35,296	1,424,000	1.4	440,000	-95.1	2,694,940	77.8	22.2	351,871
Northeast Utilities	28	21,619	1,149,257	2.0	161,642	2.2	2,081,021	87.9	10.6	288,541
Otter Tail Power	92	3,396	121,862	-0.1	0	NA	175,454	100.0	0.0	20,818
Pacific Gas & Electric	5	64,728	3,760,521	2.0	3,082,935	2.1	8,430,981	69.0	31.0	866,575
Pacificorp	26	27,118	660,491	0.7	0	NA	1,983,000	56.4	0.0	219,800
Pennsylvania Power & Light	23	28,119	1,055,546	1.6	0	NA	1,976,502	99.7	0.0	199,327
Philadelphia Electric	22	28,135	1,375,864	1.3	311,706	1.8	3,013,704	83.5	14.2	434,724
Public Service of New Hampshire	73	7,070	322,656	4.3	0	NA	519,740	97.3	0.0	113,761
Public Service of New Mexico	69	7,437	255,122	4.6	315,009	NA	748,984	54.5	44.4	124,178
Puget Sound Power & Light	42	15,972	626,642	3.3	0	NA	714,108	100.0	0.0	100,963
Rochester Gas & Electric	72	7,110	307,558	1.8	241,072	1.7	743,115	63.7	36.3	108,468
San Diego Gas & Electric	53	11,658	893,868	4.7	570,770	4.3	1,738,702	80.3	-19.7	178,925
Southern Indiana Gas & Electric	86	4,138	108,552	1.5	65,488	1.4	262,844	69.6	29.8	28,104
Southwestern Public Service	40	16,608	349,407	1.3	0	NA	831,805	99.7	0.0	108,686
Teco Energy	62	11,820	401,316	4.8	0	NA	886,200	96.7	0.0	98,700
Texas Utilities	3	73,370	2,015,023	5.3	0	NA	4,170,157	100.0	0.0	587,758
TNP Enterprises	74	6,616	193,907	2.2	0	NA	429,854	99.4	0.0	15,410
Utilicorp United	96	2,702	144,676	2.8	359,595	504.0	243,150	76.4	23.6	22,538
Washington Water Power	57	9,256	238,492	1.0	80,290	2.2	459,454	71.5	28.0	64,591
Wisconsin Electric Power	34	18,744	838,851	1.0	229,766	1.7	1,428,738	76.0	24.0	158,389
Wisconsin Power & Light	60	8,792	319,397	1.4	109,430	2.4	588,931	73.4	25.9	56,368
Wisconsin Public Service	68	7,445	302,070	1.0	159,621	2.0	638,504	63.2	36.8	51,896

write-offs taken by utilities with abandoned nuclear plants.

However, even without the effect of major plant write-offs, income performance was off, reflecting the higher costs of operations despite consistent efforts of managements to curtail cost increases.

As a result, the median income growth was 4.9 percent, down substantially from the median of 13.8 a year ago. Overall, income production was lower than a year ago, also.

If there is anything to boast of in the overall array of performances it is that the quality of earnings appears to be stronger than in the past, continuing the trend to reduced Al-

TABLE III
THE TOP 10
NET INCOME AVAILABLE FOR COMMON STOCK

1	1	Pacific Gas & Electric	$866.6	6.9
3	3	Southern Company	829.6	15.3
5	6	Texas Utilities	587.8	11.7
7	9	Public Service Electric & Gas	484.6	12.7
9	13	Long Island Lighting	440.6	29.5

lowances for Funds Used During Construction.

Earnings decline

Average earnings per share of common stock fell to $2.84 in 1985, down 9.6 percent from 1984. This was based on the returns of 99 companies (Centel did not provide financial data) and included the devastating effect of write-offs of cancelled nuclear power plants.

Although a number of utilities were forced to write off investment in cancelled plants, the two hit the hardest were Public Service of Indiana, which wrote off $1.3 billion of its Marble Hill nuclear plant in 1985, and Consumers Power, which took a $488-million write-off on its investment in the Midland plant. If only the results of these two are removed from the earnings comparisons, the average EPS of the other 97 would increase one cent to $3.19 from $3.18 in 1984.

For 1985, 51 companies reported gains in earnings and 46 reported declines. A year ago, 72 companies reported gains and in 1983 the total number of gainers was 82.

Last year median growth was 0.45 percent, drastically down from the median of 6.41 percent in 1984, 9.63 percent in 1983 and 10.32 percent in 1982.

As is usual, those companies reporting the largest gains were coming off tough years in 1984. Five of this year's leaders were in the bottom ten a year ago. Only one company, Potomac Electric Power, is a repeater in the top 25 companies in 1985, although it dropped from 10th to 13th.

The majority of the companies at the bottom of the EPS-growth list suffered nuclear plant write-offs in 1985. Unfortunately, most also are repeaters from the bottom of the EPS-growth list from 1983 and several have been at or near the bottom for one or more previous years.

Fire risk high for T-G units, survey results show

CHICAGO—Results of a recent survey show that the fire risk to a turbine generator is one fire per 185 unit-years of operation, with the average fire causing about $850,000 in property damage and approximately 39 days of unit downtime.

Conducted for the Electric Power Research Institute by Black & Veatch, Engineers-Architects, the survey found that there were no instances of significant fire damage or outages where a properly engineered fire protection system was installed.

Black & Veatch received 151 responses from 210 utilities surveyed. The questions regarded steam turbine generator fires and explosions within the utility industry from 1930 to 1983.

David T. Hall and Thomas C. Clayton reported the results of the study at the recent American Power Conference. Westinghouse Electric Corp. and General Electric Co. participated as subcontractors in the report.

According to the authors, the survey was undertaken because statistics indicate that the fire risk for a large turbine generator set is unacceptably high.

Most common cause

The authors found that there were 175 fires and 33 explosions in the period surveyed. According to the study, the most common cause of fire was oil (see table) and the most likely location was in the bearings (39 fires). In addition, fires were reported in the piping (16), valves (14), below the operating floor (14), and in the turbine reservoir and tanks (7).

The survey findings show that manually activated water spray systems were the most common type of fire suppression used by utilities for turbine and generator bearings. Carbon dioxide systems were used most on the turbine governor housing of nuclear units and carbon dioxide and water systems were split evenly on coal-fired systems.

Heat detection was the most popular means of fire detection for all turbine generator areas.

Said the authors, "The major concerns of the turbine generator manufacturers regarding water-based fire suppression involve possible adverse effects on the turbine generator and associated equipment in the event of water spray when a fire does not exist."

Water damage minimal

In the majority of cases reported by the utilities, water was applied because of a fire. The survey found that in almost all of the cases, water damage to the turbine was less than $300. No downtime was reported because of water being applied.

Analysis showed

An analysis of the survey results showed that oil is the greatest fire hazard associated with the turbine generator and its auxiliary equipment.

"Forty-five of the fifty-five significant fires, defined as causing one day or more in unit outage or $100,000 (1983 dollars) property damage, involved oil, " reported the Black & Veatch engineers.

SUMMARY OF FIRE OCCURRENCE/ EXPLOSIONS BY TYPE

Type	Fires/ Explosions
Oil[a]	91
Hydraulic oil[b]	16
Hydrogen explosion and oil fire	3
Hydrogen[c]	15
Hydrogen and oil	9
Hydrogen explosion[d]	33
Electrical	18
Class A[e]	9
Hydrogen fire and explosion	1
Paint	1
Undetermined	12
Total	208

[a] Includes listing of oil and lube oil. A number of these are thought to have been units where lube oil was used as hydraulic oil.
[b] Two of these fires involved fire-resistant hydraulic fluid. The fires were of the smoldering type in insulation with minor or negligible damage.
[c] Includes only hydrogen fires with no concurrent oil fire or explosion.
[d] Includes only hydrogen explosions with no concurrent fire.
[e] Class A fires are cable insulation, paper, wood, etc., as defined by the NFPA.

Source: "Turbine Generator Fire Protection Overview," Hall & Clayton, Black & Veatch Engineers-Architects, April 1986

The survey recommends that a fixed fire protection system should be provided for the turbine generator bearings, lube oil piping under the turbine generator lagging, the exciter, areas below the turbine floor, the lube oil reservoir, and the boiler feed pump turbines.

Black & Veatch determined that the best method of fire suppression for oil fires is water, while the most effective method for excitor fires was found to be carbon dioxide.

The authors presented several features that they recommended be included in a fire protection system for nuclear and fossil fueled units.

Recommendations

They recommend use of:

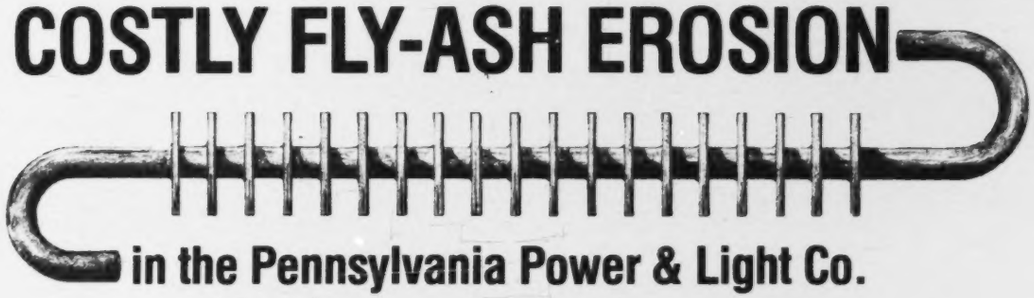
1. An automatic water spray with closed head nozzles for the turbine generator bearings.
2. An automatic wet pipe sprinkler system (nonfreezing conditions) under the turbine generator lagging.
3. A manual carbon dioxide system for the excitor.
4. An automatic wet pipe sprinkler system (nonfreezing conditions) under the operating floor.
5. An automatic water spray with open heads for the lube oil reservoir.
6. An automatic water spray with closed head nozzles for the boiler feed pump turbine bearings and steam generator feedwater pump turbine bearings.

The system designed for the study was engineered for a 600 to 700 MW fossil fueled unit.

Additional fire risk

Black & Veatch conducted a risk-benefit analysis and found that the additional fire risk in 1983 dollars for 30 years of operation without a fire protection system is $1,620,000 for a 600 MW coal unit and $870,000 for a 900 MW nuclear unit.

COSTLY FLY-ASH EROSION



in the Pennsylvania Power & Light Co.
750 mw coal-fired No. 3 boiler
economizer at Brunner Island
required that the original unit be replaced.

A RESEARCHED AND EVALUATED DECISION WAS MADE IN FAVOR OF

SENIOR GREEN ECONOMIZERS

In a change from a close pitch, staggered tube arrangement— PP&L's specification stated that "replacement elements may have welded fins or be bare tube", and more specifically "the elements of both banks shall be of an in-line arrangement; that is, uniform, vertical, open lanes shall be established between successive elements. These open lanes shall be unobstructed over the entire depth of the elements."

SENIOR GREEN ECONOMIZERS met these specifications, offered the specified performance within the dimensions of the existing economizer chamber— and at an inlet gas velocity of 50 fps as compared with the original 76 fps.

In its research, PP&L learned that there are over 240 coal-fired utility boilers throughout the world which have Senior Green Economizers installed.

If you have velocity-induced fly-ash erosion problems, or if you need to increase your present economizer performance, call SENIOR GREEN. We could have the answer!

Segl
Division of Senior Green Inc.
SENIOR GREEN ECONOMIZERS
PO Drawer 517 • Lyman SC 29365 • (803) 439-3091 • (800) 845-3052 • Telex: 570307

©1985 Senior Green Inc.